



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: AE3007A1E BYPASS RATIO (-): 4.8
 UNIQUE ID NUMBER: 01P06AL032 PRESSURE RATIO π_{co} (-): 18.6
 COMBUSTOR: Type 3 (reduced emissions)
 ENGINE TYPE: MTF RATED OUTPUT F_{co} (kN): 37.4

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{co} (mg/kN)	LTO_{num}/F_{co} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{co} AND MAX nvPM _{mass}	158.5	2.86E+15	289
AS % OF CAEP/10 LIMIT	-	-	2.4
AS % OF CAEP/11 LIMIT (InP)	4.1	12.7	
AS % OF CAEP/11 LIMIT (NT)	16.0	24.1	

MEASURED DATA

MODE	POWER SETTING (% F_{co})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	0.415	45.7	2.60E+14	
CLIMB OUT	85	2.2	0.347	38.0	3.01E+14	
APPROACH	30	4.0	0.125	9.7	3.17E+14	
IDLE	7	26.0	0.051	17.9	6.12E+14	
LTO TOTAL (kg, mg, number of particles)			174	4267	7.69E+16	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{co} VALUES (mg/kN, particles/kN)				114.1	2.06E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				45.7	6.12E+14	224

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{co})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	50.8	6.00E+14
CLIMB OUT	85	43.0	7.52E+14
APPROACH	30	12.6	1.20E+15
IDLE	7	24.9	2.37E+15

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.8	99.9	HEAT OF COMBUSTION (MJ/kg)	43.20
TEMPERATURE (K)	272.8	283.2	HYDROGEN CONTENT (%mass)	13.69
HUMIDITY (kg water/kg dry air)	0.0018	0.0067	AROMATICS CONTENT (%vol)	16.2
			NAPHTHALENE CONTENT (%vol)	0.42
			SULPHUR CONTENT (ppm by mass)	81

MANUFACTURER: Rolls-Royce Corporation
 TEST ORGANIZATION: MS&T
 TEST LOCATION: Indianapolis
 TEST DATES: 23/03/2015-25/03/2015

REMARKS

1. Certification Report EDNS04000123846